

ABSTRACT

A composite resistive to high-temperature corrosion and abnormal oxidization, maintains original excellent high-temperature characteristics of Ni alloys over a long period of time, and suitable for applications in a high-temperature such as gas turbines, jet engines, and elements for exhaust-gas systems. A heat-resistant Ni-alloy composite has excellent high-temperature oxidation resistance, including a Ni-alloy substrate that has been subjected to an Al-diffusing treatment. The surface coat has a multi-layer structure including an inner layer composed of an  $\alpha$ -Cr phase and an outer layer composed of a  $\beta$  phase (Ni-Al-Cr) and a  $\gamma'$  phase (Ni<sub>3</sub>Al(Cr)) on the substrate surface. The Al content in the outer layer is at least 20 atomic percent. The  $\alpha$ -Cr phase functions as a diffusion-barrier layer. The outer layer retains and secures a high Al content required for self-regeneration of a defective portion of the Al<sub>2</sub>O<sub>3</sub> layer damaged in an operating condition.